Review Report

This manuscript suggests comparison method to use the International Tree-ring Data Bank (ITRDB) for validating land surface models (LSMs). Authors actually adapted these methods to the output of the ORCHIDEE-LSM. As authors mentioned, data in the ITRDB has systematic biases, direct comparison between ITRDB data and outputs of LSMs should be inappropriate. So, author's motivation for developing some comparison method makes sense.

However, the way authors explain the methods is not enough. Also, in my sense, it is too much complicated. Honestly, I had quite hard time to read this manuscript, but I still cannot understand it all. So, the purpose of this study is right, but how to prepare the manuscript has significant problem.

Major specific comments:

(1) Line 206 "virtual forest"
No definitions for the "virtual forest". As authors mentioned in the line 229-230, the proposed method largely relies on the concept of "virtual forest". So, missing its definition is ridiculous.

(2) Line 216-220 "Calendar year aligned virtual forest"
I strongly doubted this can be a metric to be compared with outputs of LSMs, because it should have systematic and strong bias as follows.
At the early stage of year, it has low values, because sampled trees (old and big trees) are in its young stages. During the middle period of the data, new trees (at young stage) add to the average calculation, and these trees function as a burden to increase the metric value. During the late period of the data, no tree enters to the average calculation anymore, so the metric value should show intense increasing trend.

(3) Lines 141-142
This sentence concludes the paragraph. But, I cannot understand why this conclusion comes out.

(4) Lines 144-153
Is it possible to rewrite this paragraph so that readers, who are not familiar with

dendrochronology and LSMs, can easily understand? Honestly, I still do not understand the point of this paragraph.

(5) Line 241

Here, the "Size related diameter growth" is identical with the "Age-aligned TRWs" in line 212? Inexplicit rephrasing causes confusion, and hence should be avoided.

(6) Lines 253-274

I cannot follow logics here.

Minor specific comments:

(1) Lines 200-202

Citing figure 4 in these sentences does not make sense.

(2) Figure 1

I think this figure is needless.

(3) Figure 4a

What the vertical axis means? Tree-ring width of the outmost stratum?

(4) Figure 4c

According to the figure caption, lines on this figure should be identical to those of the figure 4b; Figure 4b and 4c only differ in the alignment on the x-axis. But, shape of the black-dotted-lines differ between these figures.

(5) Line 676

A typo exists. Location of the period would be immediately after "(c)".

(6) lines 677-678

Is this sentence an explanation for the figure 5b? But, figure 5b shows extraction of major lines on the figure 5a, not the root-mean-square error.